

WHAT IS CLAIMED IS:

1. A method of wrapping a load with packaging material, comprising:  
providing a load having at least a first side and a second side on a load transport surface;  
providing at least one magazine containing cornerboards;  
transporting a cornerboard from the magazine in a direction parallel to a direction of movement of the load on the transport surface until a first leg of the cornerboard is proximate to the first side of a corner of the load;  
transporting the cornerboard in a direction transverse to the direction of movement of the load on the load transport surface until a second leg of the cornerboard is proximate to the second side of the corner of the load;  
dispensing packaging material from a packaging material dispenser;  
and  
moving the packaging material dispenser and the load relative to one another to wrap the packaging material around the cornerboard and load.
2. The method of claim 1, wherein providing the load includes moving the load on a conveyor.
3. The method of claim 1, wherein transporting the cornerboard from the magazine in a direction parallel to the direction of movement of the load on the load transport surface includes gripping the cornerboard with a gripper.
4. The method of claim 4, wherein gripping the cornerboard includes applying a vacuum to the cornerboard.

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5. The method of claim 3, further comprising moving the cornerboard and gripper in a vertical direction.

6. The method of claim 3, further comprising rotating the gripper and cornerboard 135 degrees.

7. The method of claim 3, further comprising rotating the gripper and cornerboard 180 degrees.

8. The method of claim 1, wherein transporting the cornerboard from the magazine in a direction parallel to the direction of movement of the load on the load transport surface includes actuating a first drive.

9. The method of claim 8, wherein transporting the cornerboard in a direction transverse to the direction of movement of the load on the load transport surface includes actuating a second drive.

10. The method of claim 1, wherein transporting the cornerboard from the magazine in a direction parallel to the direction of movement of the load on the load transport surface includes sensing the first side of the load.

11. The method of claim 1, wherein transporting the cornerboard in a direction transverse to the direction of movement of the load on the load transport surface includes sensing the second side of the load.

12. The method of claim 1, wherein the cornerboard is unformed.

13. The method of claim 12, further comprising folding the cornerboard.

14. The method of claim 13, wherein folding the cornerboard includes actuating a clamp.

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15. The method of claim 14, wherein actuating the clamp includes rotating the clamp from a retracted position to an extended position.

16. The method of claim 13, wherein folding the cornerboard includes moving a gripper holding the cornerboard from a flat position to a folded position.

17. The method of claim 1, wherein providing at least one magazine includes providing a dual magazine having first and second magazines, the first magazine containing cornerboards of a first height, and the second magazine containing cornerboards of a second, different height.

18. The method of claim 17, further comprising shifting the dual magazine to select a desired cornerboard height.

19. The method of claim 1, wherein the cornerboard is preformed.

20. A method of wrapping a load with packaging material, comprising:

providing a load on a load transport surface;

providing at least one magazine containing cornerboards;

retrieving a cornerboard from within the magazine with a gripper;

transporting the cornerboard in a direction parallel to a direction of movement of the load on the load transport surface until a first leg of the cornerboard is proximate to a first side of a corner of the load;

transporting the cornerboard in a direction transverse to the direction of movement of the load on the load transport surface until a second leg of the cornerboard is proximate to a second side of the corner of the load;

dispensing packaging material from a packaging material dispenser;

and

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moving the packaging material dispenser and the load relative to one another to wrap the packaging material around the cornerboard and load.

21. The method of claim 20, further comprising rotating the cornerboard and gripper.

22. The method of claim 21, wherein rotating includes rotating the cornerboard and gripper 135 degrees.

23. The method of claim 21, wherein rotating includes rotating the cornerboard and gripper 180 degrees.

24. The method of claim 21, wherein rotating includes rotating the cornerboard and gripper until the first leg of the cornerboard is perpendicular to the load transport surface.

25. The method of claim 21, wherein rotating includes rotating the cornerboard and gripper until the second leg of the cornerboard is parallel to the load transport surface.

26. The method of claim 20, wherein transporting the cornerboard from the magazine in a direction parallel to the direction of movement of the load on the load transport surface includes actuating a first drive.

27. The method of claim 26, wherein transporting the cornerboard in a direction transverse to the direction of movement of the load on the load transport surface includes actuating a second drive.

28. The method of claim 20, wherein transporting the cornerboard from the magazine in a direction parallel to the direction of movement of the load on the load transport surface includes sensing the first side of the load.

29. The method of claim 20, wherein transporting the cornerboard in a direction transverse to the direction of movement of the load on the load transport surface includes sensing the second side of the load.

30. The method of claim 20, wherein the cornerboard is pre-formed.

31. The method of claim 20, wherein the cornerboard is unformed.

32. The method of claim 31, further comprising folding the cornerboard.

33. The method of claim 32, wherein folding the cornerboard includes actuating a clamp to move into contact with the cornerboard held by the gripper.

34. The method of claim 32, wherein folding the cornerboard includes actuating the gripper to move from a flat position to a folded position.

35. The method of claim 20, wherein providing at least one magazine includes providing a dual magazine having a first magazine containing cornerboards of a first height and a second magazine containing cornerboards of a second height different from the first height.

36. The method of claim 35, further comprising selecting the height of the cornerboard to be used.

37. The method of claim 36, wherein selecting includes shifting the dual magazine to place one of the first and second magazines in an active position.

38. A method of wrapping a load with packaging material, comprising:  
providing a load on a turntable;  
providing at least one magazine having a longitudinal axis and  
containing cornerboards adjacent the turntable;  
retrieving a cornerboard from within the magazine with a gripper;

transporting the cornerboard in a direction parallel to the longitudinal axis of the magazine until a first leg of the cornerboard is proximate a first side of a corner of the load;

transporting the cornerboard in a direction transverse to the first direction until a second leg of the cornerboard is proximate a second side of the corner of the load;

holding the cornerboard adjacent to the load with a cornerboard holding device;

dispensing packaging material from a packaging material dispenser;  
and

rotating the turntable to wrap the packaging material around the cornerboard and load.

39. The method of claim 38, wherein retrieving a cornerboard with the gripper includes applying a vacuum to the cornerboard.

40. The method of claim 39, further comprising moving the cornerboard and gripper in a vertical direction.

41. The method of claim 38, further comprising rotating the gripper and cornerboard.

42. The method of claim 41, wherein rotating includes rotating the cornerboard and gripper 135 degrees.

43. The method of claim 41, wherein rotating includes rotating the gripper and cornerboard 180 degrees.

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44. The method of claim 41, wherein rotating includes rotating the cornerboard and gripper until the first leg of the cornerboard is perpendicular to the load transport surface.

45. The method of claim 41, wherein rotating includes rotating the cornerboard and gripper until the second leg of the cornerboard is parallel to the load transport surface.

46. The method of claim 38, wherein transporting the cornerboard in a direction parallel to the longitudinal axis of the magazine includes actuating a first drive.

47. The method of claim 46, wherein transporting the cornerboard in a direction transverse to the longitudinal axis of the magazine includes actuating a second drive.

48. The method of claim 38, wherein transporting the cornerboard in a direction parallel to the longitudinal axis of the magazine includes sensing the first side of the load.

49. The method of claim 38, wherein transporting the cornerboard in a direction transverse to the longitudinal axis of the magazine includes sensing the second side of the load.

50. The method of claim 38, wherein the cornerboard is pre-formed.

51. The method of claim 38, wherein the cornerboard is unformed.

52. The method of claim 51, further comprising folding the cornerboard.

53. The method of claim 52, wherein folding the cornerboard includes actuating a clamp to move into contact with the cornerboard held by the gripper.

54. The method of claim 52, wherein folding the cornerboard includes actuating the gripper to move from a flat position to a folded position.

55. A method of wrapping a load with packaging material, comprising:

- providing a load on a load transport surface;
- providing at least one magazine containing cornerboards;
- retrieving a cornerboard from within the magazine;
- rotating the cornerboard;
- transporting the cornerboard from the magazine in a direction parallel to a longitudinal axis of the load transport surface until a first leg of the cornerboard is proximate a first side of a corner of the load;
- transporting the cornerboard in a direction transverse to the longitudinal axis of the load transport surface until a second leg of the cornerboard is proximate a second side of the corner of the load;
- dispensing packaging material from a packaging material dispenser;

and

- moving the packaging material dispenser and the load relative to one another to wrap the packaging material around the cornerboard and load.

56. The method of claim 55, wherein retrieving the cornerboard includes using suction to grip the cornerboard.

57. The method of claim 55, further comprising lifting the cornerboard vertically within the magazine.

58. The method of claim 55, wherein rotating includes rotating the cornerboard 135 degrees.



59. The method of claim 55, wherein rotating includes rotating the cornerboard 180 degrees.

60. The method of claim 55, wherein rotating includes rotating the cornerboard until the first leg of the cornerboard is perpendicular to the longitudinal axis of the load transport surface.

61. The method of claim 55, wherein rotating includes rotating the cornerboard until the second leg of the cornerboard is parallel to the longitudinal axis of the load transport surface.

62. The method of claim 55, wherein transporting the cornerboard in a direction parallel to the longitudinal axis of the load transport surface includes actuating a first drive.

63. The method of claim 62, wherein transporting the cornerboard in a direction transverse to the longitudinal axis of the load transport surface includes actuating a second drive.

64. The method of claim 55, wherein transporting the cornerboard in a direction parallel to the longitudinal axis of the load transport surface includes sensing the first side of the load.

65. The method of claim 55, wherein transporting the cornerboard in a direction transverse to the longitudinal axis of the load transport surface includes sensing the second side of the load.

66. The method of claim 55, further comprising transporting a second cornerboard to a second corner of the load.

67. The method of claim 66, further comprising providing two magazines.

68. The method of claim 66, further comprising transporting a third cornerboard to a third corner of the load.

69. The method of claim 68, further comprising providing three magazines.

70. The method of claim 68, further comprising transporting a forth cornerboard to a forth corner of the load.

71. The method of claim 70, further comprising providing four magazines.

72. The method of claim 55, wherein the cornerboard is pre-formed.

73. The method of claim 55, wherein the cornerboard is unformed.

74. The method of claim 73, further comprising folding the cornerboard.

75. The method of claim 74, wherein folding the cornerboard comprises bending the cornerboard along a scored or perforated area.

76. The method of claim 74, wherein folding the cornerboard comprises actuating a clamp to move into contact with the cornerboard after the cornerboard has been removed from the magazine.

77. The method of claim 74, wherein retrieving the cornerboard includes grasping the cornerboard with a gripper in a flat position, and wherein folding the cornerboard includes moving the gripper from the flat position to a folded position.

78. The method of claim 55, wherein providing at least one magazine includes providing a dual magazine having a first magazine containing cornerboards of a first height and a second magazine containing cornerboards of a second, different height.

79. The method of claim 78, further comprising selecting the height of the cornerboard to be used.

80. The method of claim 79, wherein selecting includes shifting the dual magazine to place one of the first and second magazines in an active position.

81. A method of wrapping a load with packaging material, comprising:

- providing a load on a load transport surface;
- providing at least one magazine containing cornerboards;
- gripping a cornerboard within the magazine with a gripper;
- removing the cornerboard from the magazine by moving the gripper and cornerboard in a direction parallel to a longitudinal axis of the load transport surface;
- rotating the gripper and cornerboard;
- transporting the gripper and cornerboard in a direction parallel to the longitudinal axis of the load transport surface until a first leg of the cornerboard is proximate to a first side of a corner of the load;
- transporting the gripper and cornerboard in a direction transverse to the longitudinal axis of the load transport surface until a second leg of the cornerboard is proximate to a second side of the corner of the load;
- releasing the cornerboard from the gripper;
- dispensing packaging material from a packaging material dispenser;

and

- providing relative movement between the packaging material dispenser and the load to wrap the packaging material around the cornerboard and load.

82. A method of wrapping a load with packaging material, comprising:

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providing a load on a load transport surface;

providing a dual magazine having a first magazine containing cornerboards of a first height and a second magazine of a second height;

automatically selecting a height of cornerboards to be used for wrapping the load;

retrieving a cornerboard of the selected height from the dual magazine;

transporting the cornerboard to a corner of the load;

dispensing packaging material from a packaging material dispenser;

and

providing relative movement between the packaging material dispenser and the load to wrap the packaging material around the cornerboard and load.

83. The method of claim 82, wherein automatically selecting the cornerboard height includes shifting the dual magazine to place one of the first and second magazines in an active position.

84. The method of claim 82, wherein transporting the cornerboard to a corner of the load includes moving the cornerboard in a direction parallel to a direction of movement of the load on the load transport surface until a first leg of the cornerboard is proximate a first side of a corner of the load.

85. The method of claim 84, wherein transporting the cornerboard further includes moving transporting the cornerboard in a direction transverse to the direction of movement of the load on the load transport surface until a second leg of the cornerboard is proximate a second side of the corner of the load.

86. The method of claim 82, wherein retrieving the cornerboard includes gripping the cornerboard while within the magazine with a gripper.

87. The method of claim 86, wherein retrieving the cornerboard further includes moving the gripper and cornerboard in a direction parallel to a direction of movement of the load on the transport surface.

88. The method of claim 82, further comprising rotating the cornerboard prior to transporting the cornerboard to the corner of the load.

89. The method of claim 82, further comprising folding the cornerboard.

90. A method of wrapping a load with packaging material, comprising:

providing a load on a load transport surface;

providing at least one magazine containing unformed cornerboards;

removing a cornerboard from within the magazine;

folding the cornerboard;

transporting the cornerboard to a corner of the load subsequent to folding the cornerboard;

dispensing packaging material from a packaging material dispenser;

and

moving the packaging material dispenser and the load relative to one another to wrap the packaging material around the cornerboard and load.

91. The method of claim 90, wherein removing the cornerboard includes gripping the cornerboard with a gripper.

92. The method of claim 91, wherein gripping the cornerboard with a gripper includes applying a vacuum to the cornerboard.

93. The method of claim 90, wherein folding the cornerboard includes actuating a clamp to move into contact with at least a portion of the cornerboard.

94. The method of claim 93, wherein the clamp is moved into contact with a portion of the cornerboard having scoring or perforations.

95. The method of claim 93, wherein folding the cornerboard further includes moving a gripper holding the cornerboard from a flat position to a folded position.

96. The method of claim 91, wherein folding the cornerboard includes moving the gripper from a flat position to a folded position.

97. The method of claim 90, wherein transporting the cornerboard includes moving the cornerboard in a direction parallel to a longitudinal axis of the load transport surface until a first leg of the cornerboard is proximate a first side of a corner of the load.

98. The method of claim 97, wherein transporting the cornerboard further includes moving the cornerboard in a direction transverse to the longitudinal axis of the load transport surface until a second leg of the cornerboard is proximate a second side of the corner of the load.

99. The method of claim 90, wherein providing the load includes moving the load on a conveyor.

100. The method of claim 90, further comprising rotating the cornerboard approximately 180 degrees prior to transporting.

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101. The method of claim 98, wherein moving the cornerboard in a direction parallel to the longitudinal axis of the load transport surface includes actuating a first drive.

102. The method of claim 97, wherein moving the cornerboard in a direction parallel to the longitudinal axis of the load transport surface includes sensing the first side of the load.

103. The method of claim 101, wherein moving the cornerboard in a direction perpendicular to the longitudinal axis of the load transport surface includes actuating a second drive.

104. The method of claim 98, wherein moving the cornerboard in a direction perpendicular to the longitudinal axis of the load transport surface includes sensing the second side of the load.

105. A method of wrapping a load with packaging material, comprising:

- providing a load on a load transport surface;
- holding an unformed cornerboard with a gripper;
- folding the unformed cornerboard;
- transporting the folded cornerboard in a direction parallel to a longitudinal axis of the load transport surface until a first leg of the cornerboard is proximate a first side of a corner of the load;
- transporting the folded cornerboard in a direction transverse to the longitudinal axis of the load transport surface until a second leg of the cornerboard is proximate a second side of the corner of the load;

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dispensing packaging material from a packaging material dispenser;

and

wrapping the packaging material around the cornerboard and load.

106. The method of claim 105, wherein folding the unformed cornerboard includes moving the gripper from a flat position to a folded position.

107. The method of claim 106, wherein moving the gripper includes rotating a first wall portion of the gripper with respect to a second wall portion of the gripper such that the wall portions form a angle of about 90 degrees.

108. The method of claim 106, wherein folding the unformed cornerboard further comprises actuating a clamp to move into contact with the cornerboard.

109. The method of claim 108, wherein the clamp contacts the unformed cornerboard at a portion of the cornerboard having scoring or perforations.

110. An apparatus for wrapping a load with packaging material, comprising:  
a packaging material dispenser for dispensing packaging material;  
a load transport surface having a longitudinal axis;  
a cornerboard gripper movable in a first direction parallel to the longitudinal axis of the load transport surface and movable in a second direction transverse to the longitudinal axis of the load transport surface; and  
means for providing relative movement between the packaging material dispenser and the load to wrap packaging material around the cornerboard and load.

111. The apparatus of claim 110, wherein the load transport surface includes a conveyor.

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112. The apparatus of claim 111, wherein the conveyor includes powered rollers.

113. The apparatus of claim 110, further comprising a first drive to drive the gripper.

114. The apparatus of claim 113, wherein the gripper is mounted on a transport arm.

115. The apparatus of claim 114, further comprising a second drive to drive the transport arm.

116. The apparatus of claim 110, further comprising a drive shaft parallel to the load transport surface.

117. The apparatus of claim 116, further comprising a transport arm mounted on the drive shaft.

118. The apparatus of claim 117, wherein the gripper is mounted on the transport arm.

119. The apparatus of claim 118, wherein the transport arm moves the gripper in a direction parallel to the longitudinal axis of the load transport surface.

120. The apparatus of claim 118, wherein the gripper is moveable along a length of the transport arm between a free end and a mounted end of the transport arm.

121. The apparatus of claim 110, wherein the cornerboard gripper includes at least one suction cup for gripping the cornerboard.

122. The apparatus of claim 110, further comprising a drive configured to rotate the cornerboard gripper.

123. The apparatus of claim 110, wherein the cornerboard gripper includes at least one sensor for sensing proximity to a side of the load.

124. The apparatus of claim 110, wherein the cornerboard gripper includes a sensor for sensing a cornerboard.

125. The apparatus of claim 110, further comprising at least one magazine for containing cornerboards.

126. The apparatus of claim 110, further comprising a first drive for permitting the cornerboard gripper to transport the cornerboard in a first direction parallel to the longitudinal axis of the load transport surface.

127. The apparatus of claim 126, further comprising a second drive for permitting the cornerboard gripper to transport the cornerboard in a second direction transverse to the longitudinal axis of the load transport surface.

128. The apparatus of claim 110, wherein the gripper includes first and second wall portions connected by a hinge.

129. The apparatus of claim 128, wherein the first and second wall portions are movable between a flat position and a folded position.

130. The apparatus of claim 110, further comprising means for folding cornerboards.

131. The apparatus of claim 130, wherein the means for folding cornerboards includes a clamp.

132. The apparatus of claim 131, wherein the clamp is movable between a retracted position and an extended position.

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133. The apparatus of claim 110, further comprising a dual magazine having a first magazine for containing cornerboards of a first height and a second magazine for containing cornerboards of a second height different from the first height.

134. The apparatus of claim 133, further comprising means for placing one of said first and second magazines in an active position.

135. The apparatus of claim 134, wherein said means for placing include an air cylinder.

136. An apparatus for wrapping a load with packaging material, comprising:  
a packaging material dispenser for dispensing packaging material;  
at least one magazine having a longitudinal axis for containing cornerboards;

a turntable for providing relative rotation between the packaging material dispenser and the load to wrap packaging material around at least one cornerboard and load;

a cornerboard gripper movable in a first direction parallel to the longitudinal axis of the magazine and movable in a second direction transverse to the longitudinal axis of the magazine; and

a cornerboard holding device for holding the cornerboard as the turntable rotates.

137. The apparatus of claim 136, wherein the cornerboard gripper is mounted on a transport arm.

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138. The apparatus of claim 137, wherein the transport arm moves the cornerboard gripper in a direction parallel to the longitudinal axis of the magazine.

139. The apparatus of claim 137, wherein the cornerboard gripper is moveable along a length of the transport arm between a free end and a mounted end of the transport arm.

140. The apparatus of claim 136, wherein the cornerboard gripper includes at least one suction cup for gripping the cornerboard.

141. The apparatus of claim 136, further comprising a drive configured to rotate the cornerboard gripper.

142. The apparatus of claim 136, wherein the cornerboard gripper includes at least one sensor for sensing proximity to a side of the load.

143. The apparatus of claim 136, wherein the cornerboard gripper includes a sensor for sensing a cornerboard.

144. The apparatus of claim 136, further comprising a first drive for permitting the cornerboard gripper to transport the cornerboard in a first direction parallel to the longitudinal axis of the magazine.

145. The apparatus of claim 144, further comprising a second drive for permitting the cornerboard gripper to transport the cornerboard in a second direction transverse to the longitudinal axis of the magazine.

146. The apparatus of claim 136, further comprising means for folding cornerboards.

147. The apparatus of claim 146, wherein the means for folding cornerboards includes a clamp.

148. The apparatus of claim 147, wherein the clamp is movable between a retracted position and an extended position.

149. The apparatus of claim 136, wherein the gripper includes first and second wall portions connected by a hinge.

150. The apparatus of claim 149, wherein the first and second wall portions are movable between a flat position and a folded position.

151. The apparatus of claim 136, wherein the at least one magazine is a dual magazine having a first magazine for containing cornerboards of a first height and a second magazine for containing cornerboards of a second, different height.

152. The apparatus of claim 151, further comprising means for placing one of said first and second magazines in an active position.

153. The apparatus of claim 152, wherein said means for placing include an air cylinder.

154. An apparatus for wrapping a load with packaging material, comprising:  
a packaging material dispenser for dispensing packaging material;  
a load transport surface having a longitudinal axis;  
a rotatable cornerboard gripper movable in a first direction parallel to the longitudinal axis of the load transport surface and movable in a second direction transverse to the longitudinal axis of the load transport surface; and  
means for providing relative movement between the packaging material dispenser and the load to wrap packaging material around the cornerboard and load.

155. An apparatus for wrapping a load with packaging material, comprising:

a packaging material dispenser for dispensing packaging material;  
a load transport surface having a longitudinal axis;  
a transport arm moveable in a first direction parallel to the longitudinal axis of the load transport surface and moveable in a second direction transverse to the longitudinal axis of the load transport surface;  
a gripper mounted on the transport arm and movable along a length of the transport arm; and  
means for providing relative movement between the packaging material dispenser and the load to wrap packaging material around the cornerboard and load.

156. A method of wrapping a load with packaging material, comprising:  
providing a load on a load transport surface having a longitudinal axis;  
providing four magazines, each magazine containing cornerboards, wherein two magazines are positioned upstream of the load, one on either side of the load transport surface, and two magazines are positioned downstream of the load, one on either side of the load transport surface;  
transporting a cornerboard from each of the magazines in a direction parallel to the longitudinal axis of the load transport surface until a first leg of the cornerboard is proximate a first side of a corner of the load;  
transporting each of the cornerboards in a direction transverse to the longitudinal axis of the load transport surface until a second leg of the cornerboard is proximate a second side of the corner of the load;

dispensing packaging material from a packaging material dispenser;

and

providing relative movement between the packaging material dispenser and the load to wrap the packaging material around the cornerboards and load.

157. A method of wrapping a load with packaging material, comprising:

providing a load on a load transport surface having a longitudinal axis;

rotating a cornerboard until a first leg of the cornerboard is transverse to the longitudinal axis of the load transport surface and a second leg of the cornerboard is parallel to the longitudinal axis of the load transport surface;

transporting the cornerboard in a direction parallel to the longitudinal axis of the load transport surface until the first leg of the cornerboard is proximate a first side of a corner of the load;

transporting the cornerboard in a direction transverse to the longitudinal axis of the load transport surface until the second leg of the cornerboard is proximate a second side of the corner of the load;

dispensing packaging material from a packaging material dispenser;

and

providing relative movement between the packaging material dispenser and the load to wrap the packaging material around the cornerboard and load.

158. A method of wrapping a load with packaging material, comprising:

providing a load on a load transport surface having a longitudinal axis;

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folding an unformed cornerboard;

rotating the folded cornerboard until a first leg of the cornerboard is transverse to the longitudinal axis of the load transport surface and a second leg of the cornerboard is parallel to the longitudinal axis of the load transport surface;

transporting the folded cornerboard in a direction parallel to the longitudinal axis of the load transport surface until the first leg of the cornerboard is proximate a first side of a corner of the load;

transporting the folded cornerboard in a direction transverse to the longitudinal axis of the load transport surface until the second leg of the cornerboard is proximate a second side of the corner of the load;

dispensing packaging material from a packaging material dispenser;

and

providing relative movement between the packaging material dispenser and the load to wrap the packaging material around the cornerboard and load.

159. An apparatus for wrapping a load with packaging material, comprising:

a packaging material dispenser for dispensing packaging material;

a load transport surface having a longitudinal axis;

four magazines, each magazine for containing cornerboards, wherein two magazines are positioned upstream of the load, one on either side of the load transport surface, and two magazines are positioned downstream of the load, one on either side of the load transport surface;



four cornerboard grippers, each gripper movable in a first direction parallel to the longitudinal axis of the load transport surface and movable in a second direction transverse to the longitudinal axis of the load transport surface; and means for providing relative movement between the packaging material dispenser and the load to wrap packaging material around the cornerboard and load.

160. A method of wrapping a load with packaging material, comprising:
- providing at least one magazine containing cornerboards;
  - gripping a cornerboard in the at least one magazine with a gripper;
  - moving the gripper and cornerboard out of the at least one magazine;
  - transporting the gripper and cornerboard to a corner of the load;
  - dispensing packaging material from a packaging material dispenser;

and

providing relative movement between the packaging material dispenser and the load to wrap the packaging material around the cornerboard and load.

161. A method of wrapping a load with packaging material, comprising:
- providing at least one magazine containing cornerboards;
  - using a first drive to remove a cornerboard from the magazine;
  - using a second drive to rotate the cornerboard;
  - using the first drive to transport the cornerboard to a corner of the load;
  - dispensing packaging material from a packaging material dispenser;

and

wrapping the packaging material around the cornerboard and load.

162. The method of claim 161, wherein using the first drive to remove the cornerboard includes driving a cornerboard gripper carried on a transport arm into the magazine.

163. The method of claim 161, wherein using the second drive to rotate the cornerboard includes rotating a cornerboard gripper.

164. The method of claim 163, wherein using the second drive to rotate the cornerboard further includes rotating a transport arm supporting the cornerboard gripper.

165. The method of claim 161, wherein using the first drive to transport the cornerboard includes driving a transport arm carrying a cornerboard gripper in a first direction parallel to a longitudinal axis of the load transport surface.

166. The method of claim 165, wherein using the first drive to transport the cornerboard further includes driving the cornerboard gripper in a second direction perpendicular to the longitudinal axis of the load transport surface.

167. The method of claim 166, wherein driving the cornerboard gripper in a second direction includes moving the cornerboard gripper along a length of the transport arm.

168. The method of claim 161, wherein using the first drive to transport the cornerboard includes sensing a first side of the corner of the load.

169. The method of claim 165, wherein using the first drive to transport the cornerboard further includes sensing a second side of the corner of the load.

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170. The method of claim 161, further comprising using a third drive and a fourth drive to fold the cornerboard.

171. The method of claim 170, wherein the third drive rotates a clamp between a retracted position and an extended position.

172. The method of claim 170, wherein the fourth drive moves a cornerboard gripper between a flat position and a folded position.

173. An apparatus for wrapping a load with packaging material, comprising:  
a packaging material dispenser for dispensing packaging material;  
a load transport surface;  
at least one magazine for containing cornerboards;  
means for gripping a cornerboard within the magazine and for transporting the cornerboard to a position proximate a corner of the load; and  
means for providing relative movement between the packaging material dispenser and the load to wrap packaging material around the cornerboard and load.

174. The apparatus of claim 173, wherein the means for gripping includes a gripper.

175. The apparatus of claim 174, wherein the gripper is mounted on a transport arm.

176. The apparatus of claim 175, wherein the transport arm is mounted on a drive shaft.

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177. The apparatus of claim 176, further comprising a first drive for driving the transport arm on the drive shaft in a direction parallel to a longitudinal axis of the load transport surface.

178. The apparatus of claim 177, further comprising a second drive for driving the gripper along a length of the transport arm in a direction perpendicular to the longitudinal axis of the load transport surface.

179. The apparatus of claim 173, further comprising means for folding the cornerboard.

180. An apparatus for wrapping a load with packaging material, comprising:  
a packaging material dispenser for dispensing packaging material;  
at least one magazine for containing cornerboards;  
a transport arm connected to a first drive;  
a gripper connected to a second drive and movable from within the magazine to a position proximate to a corner of the load, wherein the first drive moves the transport arm between the magazine and the load and the second drive moves the gripper between a first and second ends of the transport arm; and  
means for wrapping the packaging material around the cornerboard and load.

181. The apparatus of claim 180, further comprising a load transport surface.

182. The apparatus of claim 180, wherein the gripper is mounted on the transport arm.

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183. The apparatus of claim 182, wherein the gripper is movable in a first vertical direction with respect to the transport arm.

184. The apparatus of claim 183, wherein the gripper is movable in a second horizontal direction along a length of the transport arm.

185. The apparatus of claim 180, wherein the gripper includes at least one suction cup for gripping the cornerboard.

186. The apparatus of claim 180, wherein the transport arm moves the gripper in a direction parallel to the load transport surface.

187. The apparatus of claim 180, further comprising a drive configured to rotate the cornerboard gripper.

188. The apparatus of claim 180, wherein the cornerboard gripper includes at least one sensor for sensing proximity to a side of the load.

189. The apparatus of claim 180, wherein the cornerboard gripper includes a sensor for sensing a cornerboard.

190. The apparatus of claim 181, wherein the first drive is configured to permit the gripper to transport the cornerboard in a first direction parallel to a longitudinal axis of the load transport surface.

191. The apparatus of claim 190, wherein the second drive is configured to permit the gripper to transport the cornerboard in a second direction transverse to the longitudinal axis of the load transport surface.

192. The apparatus of claim 180, further comprising means for folding cornerboards.

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193. The apparatus of claim 192, wherein the means for folding includes a third drive for moving a clamp between a retracted position and an extended position.

194. The apparatus of claim 193, wherein the means for folding also includes a fourth drive for moving first and second wall portions of the gripper between a flat position and a folded position.

195. An apparatus for wrapping a load with packaging material, comprising:  
a packaging material dispenser for dispensing packaging material;  
at least one magazine for containing unformed cornerboards;  
means for folding an unformed cornerboard;  
means for transporting the folded cornerboard to a position proximate a corner of the load; and  
means for wrapping the packaging material around the cornerboard and load.

196. The apparatus of claim 195, wherein the means for folding the unformed cornerboard includes a cornerboard gripper.

197. The apparatus of claim 196, wherein the cornerboard gripper includes first and second wall portions connected by a hinge.

198. The apparatus of claim 197, wherein the first and second wall portions of the gripper are movable between a flat position and a folded position.

199. The apparatus of claim 198, further comprising a first drive for moving the first and second wall portions of the gripper between the flat position and the folded position.

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200. The apparatus of claim 199, wherein the means for folding the unformed cornerboard further includes a clamp movable between a retracted position and an extended position.

201. The apparatus of claim 200, further comprising a second drive for moving the clamp between the retracted position and the extended position, wherein the unformed cornerboard is between the gripper and the clamp when the clamp is in the extended position.

202. The apparatus of claim 195, further comprising a load transport surface having a longitudinal axis.

203. The apparatus of claim 202, wherein the means for transporting the cornerboard includes a gripper movable in a first direction perpendicular to the longitudinal axis of the load transport surface.

204. The apparatus of claim 203, wherein the means for transporting the cornerboard further includes a transport arm supporting the gripper and movable in a second direction parallel to the longitudinal axis of the load transport surface.

205. A method of wrapping a load with packaging material, comprising:  
providing at least one magazine containing cornerboards;  
moving a gripper and an unformed cornerboard out of a magazine for storing unformed cornerboards;  
folding the unformed cornerboard;  
transporting folded cornerboard to a corner of the load with the gripper;  
dispensing packaging material from a packaging material dispenser;

and

providing relative movement between the packaging material dispenser and the load to wrap the packaging material around the cornerboard and load.

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